Mucopolysaccharidosis Type IIIB

**Alternative Names**
- MPS IIIB
- MPS3B
- Sanfilippo Syndrome B
- N-Acetyl-Alpha-D-Glucosaminidase Deficiency
- NAGLU Deficiency
- N-Acetylglucosaminidase, Alpha-NAGLU
- N-Acetyl-Alpha-D-Glucosaminidase Polymorphism
- NAG Polymorphism

**WHO International Classification of Diseases**
- Endocrine, nutritional and metabolic diseases

**OMIM Number**
- 252920

**Mode of Inheritance**
- Autosomal Recessive

**Gene Map Locus**
- 17q21

**Description**
Mucopolysaccharidosis type III is a lysosomal disorder caused by an impaired ability of lysosomes to degrade heparan sulphate and heparin owing to deficiency of one of the four enzymes normally involved in this process. Each of the four clinically quite similar but biochemically distinguished subtypes, A, B, C, and D, are inherited in an autosomal recessive manner. Symptoms, that become apparent between 2 and 6 years of age, include delayed speech development, sleep disturbance, and behavioral abnormalities like hyperactivity and aggressiveness. The disease leads to severe central nervous system degeneration with death occurring usually between the second and third decade. Mucopolysaccharidosis type III differs from other mucopolysaccharidoses in that patients usually exhibit only mild somatic changes, especially skeletal changes being generally minimal.

Mucopolysaccharidosis type IIIB is caused by deficiency of the lysosomal enzyme \(\alpha\)-N-acetylgalactosaminidase, NAG. This enzyme catalyses the removal of terminal \(\alpha\)-N-acetylgalactosamine residues from heparan sulphate. In the absence of NAG, partially degraded heparan sulphate accumulates in tissues and is excreted in the urine.

**Molecular Genetics**
Mucopolysaccharidosis type IIIB is caused by mutations in the N-acetyl-alpha-D-glucosaminidase gene NAGLU, an 8.5-kb gene, interrupted by 5 introns, and localized to the 5'-flanking sequence of the gene, EDH17B, on chromosome 17q21. The cDNA sequence encodes a protein of 743 amino acids, with a 20- to 23-aa signal peptide immediately preceding the amino terminus of the tissue enzyme and with six potential N-glycosylation sites.

**Epidemiology in the Arab World**

**Egypt**
Aboul Nasr and Faten (2004) performed prenatal diagnosis of mucopolysaccharidosis type III in three pregnant females with previously affected child or more with one of the mucopolysaccharidoses types. All the pregnant females were subjected to history taking, pedigree construction, clinical examination and ultrasound scan. Proper counseling was done and patients were scheduled for prenatal diagnosis. Amniocentesis was done at the 15th week gestational age in two cases to withdraw 10 ml of amniotic fluid for the analysis of the glycosaminoglycans (GAG) by the two-dimensional electrophoresis (2-DEP). Chorionic villus sampling (CVS) was done at 11-12 weeks gestational age in one case to perform the specific enzyme assay fluorimetrically which was developed during the study. In one pregnancy, a normal fetus was detected. The other two cases were affected as
tested by amniocentesis and chorionic villus sampling, respectively. Aboul Nasr and Fateen (2004) indicated that couples, with an affected mucopolysaccharidosis child, are eager to have a normal child and are keen to do prenatal diagnosis.

**Palestine**

Zhao et al. (1996) used SSCP analysis of PCR-amplified segments of genomic DNA and found homozygosity for a G-to-A transition resulting in substitution of his for arg674 in 2 patients of Arab origin from Palestine with Sanfilippo B syndrome. The homozygous R674H mutation was not shown to be a polymorphism by allele-specific nucleotide analysis of genomic DNA from 47 Arab individuals from Palestine and in 53 individuals of other ethnic groups.

**Syria**

In 1990, Fensom et al. reported a 21 months old male child, born to Syrian consanguineous parents with delayed speech, abdominal enlargement, dysmorphic facies, enlarged liver and spleen, anterior breaking of lower dorsal and lumbar vertebrae, and enlarged J-shaped scull. The patient had one normal 5 year old brother. [See also: United Arab Emirates > Fensom et al. (1990)]

**Tunisia**

Chaabouni et al. (2001) conducted a retrospective study over a period of 12 years (1988-1999) in the pediatric department of Sfax University Hospital. One case of mucopolysaccharidosis type III B was confirmed by an enzymatic proportioning. The clinical examination included a craniofacial dysmorphe besides other symptoms. The therapeutic treatment was limited to the symptomatic measures with genetic consulting and antenatal diagnosis.

**United Arab Emirates**

In 1990, Fensom et al. reported a 6 year old girl from the United Arab Emirates with mucopolysaccharidosis type IIIB. She was the product of a consanguineous marriage and showed coarse facies, mild hirsutism, broad hands, hepatomegaly, severely delayed speech, and behavioral problems. The patient was one of 13 sibs and had a sister who died at one year of age with diarrhea. Fensom et al. (1990) established the diagnosis of mucopolysaccharidosis type IIIB in their patients by demonstrating heparin sulphate in the urine and by enzyme assay.

**Yemen**

In 1990, Fensom et al. reported a 16 months old Yemeni boy who showed delayed speech, delay in motor development, and hepatosplenomagaly. He had a 4 year old sister with mental handicap and a normal brother. [See also: United Arab Emirates > Fensom et al. (1990)]

**References**


**Contributors**

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